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Environmental Monitoring in Preparation for the Installation of a Green Roof

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Green roofs are becoming an increasingly popular way to improve the environmental, economic, and social performance of both new and existing buildings. Along with the green roofs themselves, it is common in research settings to install sensors that measure various parameters that are important to the operation of the roof, such as energy and water. However, almost all of these monitoring systems are installed at the same time or even after the installation of the green roofs. Therefore, no before-and-after comparisons can be made to quantify some of the green roofs' benefits. To account for this missing data, monitoring equipment was installed on a Purdue University campus building to measure conditions for a year prior to the expected construction of a green roof. This equipment primarily consisted of a weather station to measure rainfall, air temperature and humidity, solar radiation, and wind. Additional sensors measured stormwater runoff, roof temperature, and heat flux. These values were wirelessly recorded every fifteen minutes. Data from the roof validated its expected behavior, with no delay or reduction in water runoff during storm events, and with roof temperature and heat flux heavily dependent on ambient air temperature and solar radiation. This experiment would have then been able to see significant changes in the data once the green roof was installed. Unfortunately, that specific project was cancelled, and the monitoring equipment will be moved to a different campus building as part of a new green roof attempt, but with the advantage this time of having already gained valuable experience.

Research advisor Ming Qu writes, "Andrew Martin worked with me on the green roof project through the Summer Undergraduate Research Fellowship (SURF) program in the summer of 2013. I witnessed that he developed a lot of critical-thinking skills and independence. Through working with him, I learned to be a strong mentor, and his work will be useful for my later research. It was mutually beneficial."

A view of the monitoring equipment as installed on the roof of Knoy Hall.

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